



The following information resources have been selected by the National Health Library and Knowledge Service Evidence Virtual Team in response to your question. The resources are listed in our estimated order of relevance to practicing healthcare professionals confronted with this scenario in an Irish context. In respect of the evolving global situation and rapidly changing evidence base, it is advised to use hyperlinked sources in this document to ensure that the information you are disseminating to the public or applying in clinical practice is the most current, valid and accurate. For further information on the methodology used in the compilation of this document—including a complete list of sources consulted—please see our [National Health Library and Knowledge Service Summary of Evidence Protocol](#).

## YOUR QUESTION

Do people with type 1 and type 2 diabetes carry the same risk of poorer outcomes from COVID-19?

### IN A NUTSHELL

It is unclear whether there are differences in rates of infection and severity of infection in type 1 versus type 2 diabetic patients<sup>4,5</sup>. COVID-19 positive patients' outcomes with either type of diabetes vary greatly, although not due to which type of diabetes they have—instead, their age, complications and how well they have been managing their diabetes are important variables<sup>6,9</sup>. It has been suggested that there probably isn't much difference in how the virus plays out in people with type 1 versus type 2 diabetes<sup>8</sup>, although people who already have diabetes-related health problems are more susceptible to worse outcomes if they contract COVID-19 compared to people with diabetes who are otherwise healthy, regardless of what type of diabetes they have<sup>5</sup>.

The majority of patients with type 2 diabetes are living with conditions of overweight or obesity<sup>3</sup>. As BMI is an important determinant of lung volume, respiratory mechanics and oxygenation during mechanical ventilation, these patients could be at specific risk of ventilatory failure and complications during mechanical ventilation. During the influenza A H1N1 epidemic in 2009 the disease was more severe and had a longer duration in about twofold more patients with obesity who were then treated in intensive care units compared with the background population<sup>7</sup>. There is currently no good information to tell how type 1 diabetes interacts with COVID-19 and other health aspects to affect risk<sup>6</sup>.

It is apparent that persons with diabetes are at increased risk for COVID-19 infection; and are at increased risk for medical complications including

death<sup>4</sup>. Increased vigilance and testing in outpatient diabetes and general medicine clinics for COVID-19 is recommended. Fear of contracting COVID-19 has led to an increasing number of diabetic patients cancelling their routine visits to diabetes clinics. This may lead to worsening glycemic and blood pressure control, further predisposing these vulnerable patients to COVID-19 infections<sup>4</sup>.

Taken altogether, patients with diabetes are a high-risk and complicated group of patients to treat for COVID-19, with an increased requirement of hospitalisation. It is recommended that patients with diabetes should pay intensive attention to reduce the risk of serious disease or fatality; and should follow the general prevention advice given by authorities vigilantly to avoid infection with COVID-19<sup>7</sup>.

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## INTERNATIONAL LITERATURE

### What does the international literature say?

#### [Zhu et al \(2020\) Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes<sup>1</sup>](#)

Type 2 diabetes (T2D) is a major comorbidity of COVID-19. We found that subjects with T2D required more medical interventions and had a significantly higher mortality [7.8% versus 2.7%; adjusted hazard ratio, 1.49] and multiple organ injury than the non-diabetic individuals. Finally, individuals with type 1 diabetes were excluded from our analysis as there were too few of them in the initial cohort, but it is possible that blood glucose control may also affect their outcomes during COVID-19.

#### [Drucker DJ \(2020\) Coronavirus Infections and Type 2 Diabetes: Shared Pathways with Therapeutic Implications<sup>2</sup>](#)

The available information does not indicate increased susceptibility to coronavirus infections in children or adults with type 1 diabetes (T1D). People with T1D may find that interruption of normal daily activities, changes in type



and frequency of exercise and alteration of diet routines may alter glucose control necessitating re-examination of insulin requirements.

### [Bornstein et al \(2020\) Practical recommendations for the management of diabetes in patients with COVID-19<sup>3</sup>](#)

There are certain subgroups of people with diabetes who may require specific consideration.

Elevated hemoglobin A1c in people with type 1 diabetes compromises immune function rendering them more susceptible to any infectious disease. These individuals will need more intense monitoring and supportive therapy to reduce the risk of metabolic decompensation including DKA, in particular for those taking sodium glucose co-transporter 2 inhibitors. An increase in the prevalence of severe DKA in COVID-19 positive patients with established type 1 diabetes has been observed — possibly in part due to delayed hospital admission. Thus, it is crucial to make patients with type 1 diabetes aware of this complication and reiterate about typical symptoms; home-measurement of urine or blood ketones; acute behaviour guidelines; and liberal and early inquiry of professional medical advice and sick day rules. Patients who have undergone transplantation of islets, pancreas or kidney or those on immunosuppressive therapy will be at particularly increased risk; additionally, the potential effect of coronavirus infection on pancreatic function in this group is unknown and monitoring for a recurrence of insulin requirement in those who are insulin independent after their transplant is important.

The increasing number of patients with type 2 diabetes and concomitant fatty liver disease will probably have an increased risk of a more pronounced inflammatory response including the so-called cytokine storm; these patients should be considered at increased risk of severe COVID-19 disease. Therefore, screening for hyperinflammation using laboratory trends — eg increasing ferritin, decreasing platelet counts, high-sensitivity C-reactive protein or erythrocyte sedimentation rate — are of crucial importance and might also help to identify subgroups of patients for whom immunosuppression [steroids, immunoglobulins, selective cytokine blockade] could improve the outcome.

The majority of patients with type 2 diabetes are living with conditions of overweight or obesity. Body mass index is an important determinant of lung volume, respiratory mechanics and oxygenation during mechanical ventilation, especially in the supine position. Therefore, patients with obesity and diabetes could be at specific risk of ventilatory failure and complications



during mechanical ventilation. Clinical experience with young patients with obesity and COVID-19 supports this observation. Furthermore, individuals with obesity or diabetes have an altered innate and adaptive immune response characterised by a state of chronic and low-grade inflammation with higher concentrations of the pro-inflammatory leptin and lower anti-inflammatory adiponectin. Additionally, obesity is often associated with physical inactivity leading to aggravated insulin resistance. This condition per se impairs immune response against microbial agents including macrophage activation and inhibition of pro-inflammatory cytokines and leads to a dysregulation of the immune response contributing to complications associated with obesity.

Patients with type 2 diabetes and obesity are at increased risk of complications of COVID-19, compounding the potential negative influence of surgical stress in the recovery period. Whether patients with type 2 diabetes who have had metabolic surgery will be protected from adverse outcomes of COVID-19 relative to their peers who have not undergone surgical treatment simply because of better glycaemic control remains unclear. However, metabolic surgery could induce nutritional deficiencies including reduced absorption of vitamins and micronutrients which play important roles in the regulation of the immune and stress response. Although there are no data yet to suggest that patients who had metabolic surgery are at greater risk of infection or complications from COVID-19, these patients should receive particular attention and close monitoring.

#### [Hill et al \(2020\) \[Commentary\] COVID-19 in patients with diabetes<sup>4</sup>](#)

There are a number of important unknown issues regarding diabetes and COVID-19. Thus, it is unclear whether there are differences in rates and severity of infections in men versus women with diabetes and whether there is a difference in rates of infection and severity of infection in type 1 versus type 2 diabetic patients.

It is apparent that persons with diabetes are at increased risk of COVID-19 infection; and are at increased risk for medical complications including death. This necessitates increased vigilance and testing in outpatient diabetes and general medicine clinics for COVID-19 and a lower threshold for hospitalization of these patients. In this regard, an unreported disturbing observation by the authors is that an increasing number of diabetic patients are cancelling their routine visits to diabetes clinics. This development along with the increased stress associated with social isolation and lack of physical activity provides a fertile ground for worsening glycemic and blood

pressure control, further predisposing these vulnerable patients to COVID-19 infections. As suggested by the ADA and AACE it is imperative that we alert the health care community and the public regarding the increased risks of this progressing pandemic in diabetic patients. Also, adherence to CDC guidance regarding social isolation is very important in persons with diabetes. Finally, the current situation emphasizes the need for more clinical investigation as the pandemic unfolds to fully characterize the problem and define best practices for optimum outcomes.

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## OTHER

### [American Diabetes Association \(2020\) \[Webpage\] Worried about the Coronavirus? Here's what you should know<sup>5</sup>](#)

Are the risks different for people with type 1 and type 2 diabetes?

In general, we don't know of any reason to think COVID-19 will pose a difference in risk between type 1 and type 2 diabetes. More important is that people with either type of diabetes vary in their age, complications and how well they have been managing their diabetes.

People who already have diabetes-related health problems are likely to have worse outcomes if they contract COVID-19 than people with diabetes who are otherwise healthy, whichever type of diabetes they have.

### [Oxford University Centre for Evidence-Based Medicine \(2020\) \[Evidence Summary\] Diabetes and risks from COVID-19<sup>6</sup>](#)

[Diabetes UK](#) has stated that everyone with diabetes including type 1, type 2 and gestational is at risk of developing a severe illness with COVID-19, but that the way it affects people varies from person to person; this is true of everyone, not just people with diabetes. They do not know how the virus may affect people in diabetes remission. The [Juvenile Diabetes Research Foundation](#) had indicated that people with type 1 diabetes who have glucose values close to target may not be at greater risk unless their situation is complicated by other concerns. They state that there is currently no good information on how type 1 diabetes interacts with COVID-19 and other health aspects to affect risk.

### [Madbad D \(2020\) \[Webpage\] COVID-19 Infection in People with Diabetes<sup>7</sup>](#)

Many patients with type 2 diabetes are obese and obesity is also a risk factor for severe infection. It was illustrated during the influenza A H1N1 epidemic in 2009 that the disease was more severe and had a longer duration in about



twofold more patients with obesity who were then treated in intensive care units compared with the background population. Specifically, metabolic active abdominal obesity is associated with higher risk. In patients with type 1 diabetes treated with basal bolus or insulin pump therapy, the insulin doses should be titrated using frequent glucose and ketone monitoring to avoid hypoglycaemia in patients with reduced food intake, and adding correctional bolus of fast-acting insulin to avoid severe hyperglycaemia and ketoacidosis. Taken altogether, patients with diabetes are a high-risk and complicated cohort to treat for COVID-19, with an increased requirement of hospitalisation. Patients with diabetes need intensive attention to reduce the risk of fatalities. Patients with diabetes should follow the general prevention advice given by the authorities thoroughly to avoid infection with COVID-19.

### [Basile LM \(2020\) \[Webpage\] Diabetes and COVID-19: How to prepare for the Coronavirus with diabetes<sup>8</sup>](#)





There probably isn't too much of a difference in how the virus plays out in people with type 1 versus type 2 diabetes according to Dr. Robert Gabbay, Chief Medical Officer, Joslin Diabetes Center in Boston.

### [University of Oklahoma Health Sciences Center \(2020\) \[Webpage\] People With Diabetes May Face Complications with COVID-19<sup>9</sup>](#)

It does not appear that COVID-19 infects people with type 1 and type 2 diabetes differently; instead, symptoms and risks vary by age, complications and how well diabetes is being managed.

Produced by the members of the National Health Library and Knowledge Service Evidence Team<sup>†</sup>. Current as at 14 May 2020. This evidence summary collates the best available evidence at the time of writing and **does not replace clinical judgement or guidance**. Emerging literature or subsequent developments in respect of COVID-19 may require amendment to the information or sources listed in the document. Although all reasonable care has been taken in the compilation of content, the National Health Library and Knowledge Service Evidence Team makes no representations or warranties expressed or implied as to the accuracy or suitability of the information or sources listed in the document. This evidence summary is the property of the National Health Library and Knowledge Service and subsequent re-use or distribution in whole or in part should include acknowledgement of the service.

The following PICO(T) was used as a basis for the evidence summary:

|   |   |
|---|---|
|  | PATIENTS WITH DIABETES INFECTED WITH COVID-19 |
|  | TYPE 1 DIABETES                               |
|  | TYPE 2 DIABETES                               |
|  | DIFFERENT OUTCOMES?                           |

The following search strategy was used:

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| <p><b>MEDLINE</b></p> <ol style="list-style-type: none"> <li>(mh "coronavirus+")</li> <li>Covid-19 or coronavirus or "corona virus" or (wuhan n2 virus) or (("2019-ncov" or "2019 ncov")) or "severe acute respiratory syndrome coronavirus 2" or (("2019" and (new or novel) and coronavirus))</li> <li>1 or 2</li> <li>(mh "diabetes mellitus+") or (mh "diabetes mellitus, type 2+") or (mh "diabetes mellitus, type 1+") or (mh "diabetes complications+")</li> <li>Diabet*.ab,ti.</li> <li>4 or 5</li> <li>3 and 6</li> <li>Limit 7 to yr= "2019 – 2020"</li> </ol> <p><b>EMBASE</b></p> <ol style="list-style-type: none"> <li>1. Coronavirinae/ 2. Covid-19.ab,ti. 3. Coronavirus.ab,ti. 4. "corona virus".ab,ti. 5. (wuhan adj3 virus).ab,ti. 6. ("2019-ncov" or "2019 ncov").ab,ti.</li> <li>7. "severe acute respiratory syndrome coronavirus 2".ab,ti. 8. ("2019" and (new or novel) and coronavirus).ab,ti. 9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8</li> <li>10. Exp diabetes mellitus/ 11. Exp insulin dependent diabetes mellitus/ 12. Exp non insulin dependent diabetes mellitus/</li> <li>13. Diabet*.ab,ti. 14. 10 or 11 or 12 or 13 15. 9 and 14 16. Limit 15 to yr="2019 – 2020"</li> </ol> |
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<sup>1</sup> Zhu L, She ZG, Cheng X, et al. Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes [published online ahead of print, 2020 May 1]. *Cell Metab.* 2020;S1550-4131(20)30238-2. doi:10.1016/j.cmet.2020.04.021

<sup>2</sup> Drucker DJ. Coronavirus Infections and Type 2 Diabetes-Shared Pathways with Therapeutic Implications. *Endocr Rev.* 2020;41(3):bnaa011. doi:10.1210/edrv/bnaa011



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- <sup>3</sup> Bornstein SR, Rubino F, Khunti K, et al. Practical recommendations for the management of diabetes in patients with COVID-19 [published online ahead of print, 2020 Apr 23]. *Lancet Diabetes Endocrinol.* 2020;S2213-8587(20)30152-2. doi:10.1016/S2213-8587(20)30152-2
- <sup>4</sup> Hill MA, Mantzoros C, Sowers JR. Commentary: COVID-19 in patients with diabetes [published online ahead of print, 2020 Mar 24]. *Metabolism.* 2020;107:154217. doi:10.1016/j.metabol.2020.154217
- <sup>5</sup> American Diabetes Association (2020). Worried about the coronavirus? Here's what you should know. <https://www.diabetes.org/covid-19-faq> [Accessed 12 May 2020].
- <sup>6</sup> Centre for Evidence-Based Medicine (2020). Diabetes and risks from COVID-19. <https://www.cebm.net/covid-19/diabetes-and-risks-from-covid-19/> [Accessed 12 May 2020].
- <sup>7</sup> Madbad, D. (2020). Covid-19 Infection in People With Diabetes. <https://www.touchendocrinology.com/insight/covid-19-infection-in-people-with-diabetes/> [Accessed May 13, 2020].
- <sup>8</sup> Basile, LM. (2020). Diabetes and COVID-19: How to prepare for the Coronavirus with diabetes. <https://www.endocrineweb.com/conditions/diabetes/diabetes-covid-19> [Accessed May 13, 2020].
- <sup>9</sup> University of Oklahoma Health Sciences Center (2020). People With Diabetes May Face Complications with COVID-19. <https://www.ouhsc.edu/News/details/people-with-diabetes-may-face-complications-with-covid-19> [Accessed May 13, 2020].